8.0 REHABILITATION PLAN

8.1 PROPOSED SCHEDULE

The overall rehabilitation of the St. Mary Diversion Facility may take up to 10 years. There is a critical path to project completion which consists of selecting a Preferred Alternative (system capacity) and the environmental compliance documents. Portions of the environmental compliance studies should be started as soon as funding permits, due to the anticipated time required to finish this phase. The Preferred Alternative requires some level of economic study and an understanding of basin hydrology for the St. Mary River and the North Fork of the Milk River and their influence on the Facilities. Once a Preferred Alternative is selected, the preliminary engineering can commence. The environmental compliance documents can be completed concurrent with the feasibility studies and final designs.

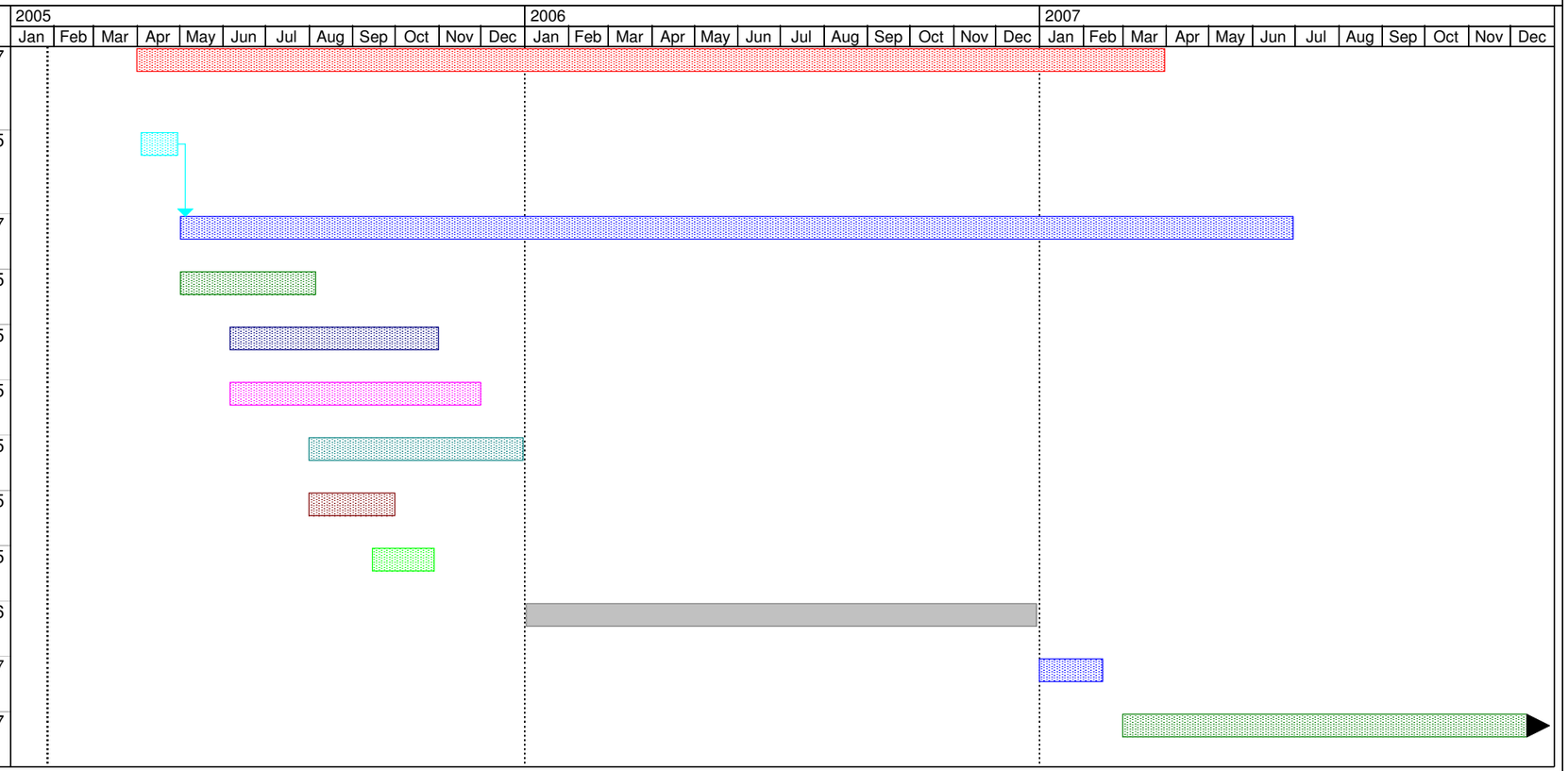
A parallel critical path involves the design of the St. Mary River Siphon replacement. We have recommended that this structure be replaced first (See Table 8.1). It is critical that the ongoing slope movements be studied, monitored and modeled so that their impact on the siphon replacement can be established. This slope stability analysis would be used to properly design the appropriate siphon replacement and/or develop slope remediation corrective measures.

With respect to the hydraulic drops, the feasibility of hydropower generation must be established to minimize engineering costs related to evaluating and designing replacement structures. A proposed timeline is shown on Figure 8.1, which assumes a projected construction start time of Spring 2007. This timeline presents our recommendations for the order of studies to be completed to achieve the target construction start date.

The construction phase of Project rehabilitation will take several years due to the size of the project and the importance of maintaining normal service during the irrigation season. Some components can be designed as replacement structures and constructed adjacent to existing structures to take advantage of the summer construction season. This would be true for the siphons, the hydraulic drops and the diversion dam/headgate facility.

PROPOSED REHABILITATION SCHEDULE - ST MARY DIVERSION FACILITIES

ID	Task Name	Duration	Start	Finish
1	Environmental Compliance Documents	521 days	Fri 4/1/05	Fri 3/30/07
2	Geotechnical Studies / Landslide Drilling Phase	20 days	Mon 4/4/05	Fri 4/29/05
3	Landslide Monitoring Phase	565 days	Mon 5/2/05	Fri 6/29/07
4	Basin Hydrology Studies	70 days	Mon 5/2/05	Fri 8/5/05
5	Economic Studies	106 days	Mon 6/6/05	Mon 10/31/05
6	Preferred Alternative Study	128 days	Mon 6/6/05	Wed 11/30/05
7	PER/Feasibility Studies	110 days	Mon 8/1/05	Fri 12/30/05
8	Hydropower Feasibility Study	45 days	Mon 8/1/05	Fri 9/30/05
9	Topographical Surveys	32 days	Thu 9/15/05	Fri 10/28/05
10	Concurrent Design Phases	260 days	Mon 1/2/06	Fri 12/29/06
11	Contractor Solicitation	33 days	Mon 1/1/07	Wed 2/14/07
12	Construction - First Phase	217 days	Thu 3/1/07	Fri 12/28/07



Project: REHAB PLAN
Date: Thu 1/27/05

Task
Split
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Split
Rolled Up Milestone
Rolled Up Progress
External Tasks
Project Summary
External Milestone
Deadline

FIGURE 8.1

For other structures such as checks, wasteways and Kennedy Creek Siphon, it may also be possible to design and construct adjacent replacement structures during the irrigation season, depending on canal realignment issues. The canals themselves will have to be designed and constructed in separate reaches consistent with what can be reasonably constructed during the off-season to avoid disruption of water service. Significant relocations away from the existing alignment may be constructed during the summer, if possible.

We have provided a recommended priority list of rehabilitation for the major structures and critical canal reaches below. One (1) is the highest priority and four (4) is the lowest.

Table 8.1 Recommended Priority of Rehabilitation

Component of Canal Systems	Recommended Priority of Rehabilitation	Reasons for Recommendations
St. Mary River Bridge	1	Existing bridge precludes access with large construction equipment and restricts replacement of the siphon and other components downstream. In addition, deterioration of the bridge has resulted in limited load capacity when the St. Mary River Siphons are full. Therefore, this is a prerequisite to replacing the St. Mary River Siphons.
St. Mary River Siphon	1	The existing siphon is in poor condition and in danger of failing at any time during an operating season. Catastrophic failure of one pipe could result in complete failure of the second pipe. Significant failure could result in loss of diverted water for two years, especially if a design for a replacement has not been prepared. Potential environmental and economic disasters.
Drop Structures Nos. 4 and 5	1	These components appear to be in danger of collapsing at any time. Loss of a drop could result in losing more than one year of diverted water.
Diversion Dam/Canal Headgates	2	Ecological impact on bull trout.
Drop Structures Nos. 1, 2 and 3	2	These components represent moderate risk of failure but less than Drops No. 4 and No. 5. Drop No. 3 chute was replaced during the winter of 2004-2005.

Component of Canal Systems	Recommended Priority for Replacement or Rehabilitation	Reasons for Recommendations
Halls Coulee Siphon	2	From the investigations which were done during the site tours, Halls Coulee Siphon appears to be in better condition than the St. Mary River Siphon. However, steel wall thicknesses were actually found to be less at Halls Coulee Siphon that at St. Mary River Siphon. This indicates that excessive corrosion has taken place at the Halls Coulee Siphon. Because of this, we are recommending that this siphon be replaced as soon as possible after St. Mary River Siphon is replaced. Catastrophic failure would be the same economically and less environmentally as the St. Mary River Siphon.
Kennedy Creek Check & Wasteway	3	It is considered advantageous to replace these structures relatively early during the rehabilitation program in the interest of being able to better control the release of excess water in the canal upstream of St. Mary Siphon.
Halls Coulee Wasteway	3	This component should be replaced because of the importance of being able to operate a wasteway structure in conjunction with Halls Coulee Siphon.
Canal from Spider Lake Check to Halls Coulee Siphon	3	Rehabilitation of this reach of canal is considered to be a higher priority than most other reaches because of the problem with landslides in this reach of the canal. If landslides occur and fill the canal with earthen material, this may result in significant disruptions to water delivery of the system until such time as the canal is cleaned out and the canal bank is repaired and stabilized.
St. Mary Canal from the Diversion Works to the St. Mary Siphon	4	These components are considered to be of the same priority in terms of urgency for rehabilitation. These components will likely need to be broken down into a number of packages with each package being of a reasonable size for construction to be done in a one-year period.
Kennedy Creek Siphon	4	
Canal From St. Mary River Siphon to Spider Lake Check	4	
Spider Lake Check	4	
Canal from Halls Coulee Siphon to Drop No. 5	4	

8.2 PROJECT COSTS

The estimated overall project costs were summarized in Section 4.8. A detailed summary of the project costs for each major structure is provided in Tables 8.2.1 and 8.2.2 for 850 and 1000 cfs, respectively. The BOR's original costs (2002 and 2003) were adjusted to include additional items such as SCADA, Tribal fees (5%) and inflation costs (3%) for an anticipated start date of Spring 2007.

Table 8.2.3 shows the total costs due to inflation, unlisted items, contingencies, non-contract items, additional recommended items, and Tribal fees. The BOR's Cost Estimating Handbook (BOR, 1989) defines unlisted items, contingencies, and non-contract items as follows:

- Unlisted Items – Percentage allowance for additional items of work which will appear in the final design required for a fully finished feature.
- Contingencies – Percentage allowance to cover minor differences between actual and estimated quantities, unforeseeable difficulties at the site, possible minor changes in the plans, and other uncertainties.
- Non-contract Costs – Non-contract activities are usually based on a percentage of the construction cost. Non-contract costs include: planning, investigations, designs and specifications, contract administration, water rights, environmental permits, and rights-of-ways.

TABLE 8.2.1 OVERALL ESTIAMTED PROJECT COSTS – 850 cfs

Line Items	Diversion Dam and Headgates	Kennedy Creek Siphon	Kennedy Creek and Wasteway	St. Mary River Siphon	Hall Coulee Siphon	Hydraulic Drops No. 1 – No. 5	Canal Prism Rehab.	TOTALS
Approx. Construction Costs	$6,608,700	$504,300	$849,300	$4,512,300	$2,176,500	$2,351,600	$32,466,900	$49,469,600
Inflation Costs [1]	$1,052,600[2]	$63,300	$106,600	$566,300	$273,200	$295,200	$4,074,900	$6,432,100
Subtotal	$7,661,300	$567,600	$955,900	$5,078,600	$2,449,700	$2,646,800	$36,541,800	$55,901,700
Unlisted Items (10%)	$1,149,200[3]	$56,800	$95,600	$507,900	$244,900	$264,700	$3,654,200	$5,973,300
Subtotal	$8,810,500	$624,400	$1,051,500	$5,586,500	$2,694,600	$2,911,500	$40,196,000	$61,875,000
Contingencies (25%)	$2,202,600	$156,100	$262,900	$1,396,600	$673,700	$727,800	$10,048,500	$15,468,200
Subtotal	$11,013,100	$780,500	$1,314,400	$6,983,100	$3,368,300	$3,639,300	$50,244,500	$77,343,200
Non-Contract Costs (37%)	$4,074,900	$288,700	$486,400	$2,583,700	$1,246,300	$1,346,600	$18,590,500	$28,617,100
Subtotal	$15,088,000	$1,069,200	$1,800,800	$9,566,800	$4,614,600	$4,985,900	$68,835,000	$105,960,300
TD&H Recommended Items	$100,000 [4]	$0	$50,000 [4]	$0	$0	$0	$7,816,000 [5]	$7,966,000
Subtotal	$15,188,000	$1,069,200	$1,850,800	$9,566,800	$4,614,600	$4,985,900	$76,651,000	$113,926,300
Tribal Fees (5%)	$759,400	$53,500	$92,500	$478,400	$230,700	$249,300	$3,832,500	$5,696,300
Total Costs per Structure	$15,947,400	$1,222,700	$1,943,300	$10,045,200	$4,845,300	$5,235,200	$80,483,500	$119,622,600

Notes: 1. Inflation costs are based on 3% growth rate over 4 years (12.55%), except where noted.
2. Inflation costs are based on 3% growth rate over 5 years (15.93%).
3. 15% used to calculate unlisted items.
4. SCADA
5. SCADA and considerations for canal realignment, relocation, armoring and two-bank construction.

TABLE 8.2.2 OVERALL ESTIAMTED PROJECT COSTS – 1000 cfs

Line Items	Diversion Dam and Headgates	Kennedy Creek Siphon	Kennedy Creek and Wasteway	St. Mary River Siphon	Hall Coulee Siphon	Hydraulic Drops No. 1 – No. 5	Canal Prism Rehab.	TOTALS
Approx. Construction Costs	$6,956,500	$663,600	$913,000	$6,104,800	$2,229,600	$2,431,300	$33,368,500	$52,667,300
Inflation Costs [1]	$1,108,000[2]	$83,200	$114,600	$766,200	$279,800	$305,200	$4,188,000	$6,845,000
Subtotal	$8,064,500	$746,800	$1,027,600	$6,871,000	$2,509,400	$2,736,500	$37,556,500	$59,512,300
Unlisted Items (10%)	$1,209,700[3]	$74,700	$102,800	$687,200	$251,000	$273,600	$3,755,700	$6,354,700
Subtotal	$9,274,200	$821,500	$1,130,400	$7,558,200	$2,760,400	$3,010,100	$41,312,200	$65,867,000
Contingencies (25%)	$2,318,600	$205,400	$282,600	$1,889,500	$690,100	$752,600	$10,328,100	$16,466,900
Subtotal	$11,592,800	$1,026,900	$1,413,000	$9,447,700	$3,450,500	$3,762,700	$51,640,300	$82,333,900
Non-Contract Costs (37%)	$4,289,300	$380,000	$522,800	$3,495,600	$1,276,600	$1,392,200	$19,106,800	$30,463,300
Subtotal	$15,882,100	$1,406,900	$1,935,800	$12,943,300	$4,727,100	$5,154,900	$70,747,100	$112,797,200
TD&H Recommended Items	$100,000 [4]	$0	$50,000 [4]	$0	$0	$0	$8,038,600 [5]	$8,188,600
Subtotal	$15,982,100	$1,406,900	$1,985,800	$12,943,300	$4,727,100	$5,154,900	$78,785,700	$120,985,800
Tribal Fees (5%)	$779,100	$70,300	$99,300	$647,200	$236,400	$257,700	$3,939,300	$6,049,300
Total Costs per Structure	$16,781,200	$1,477,200	$2,085,100	$13,590,500	$4,963,500	$5,412,600	$82,725,000	$127,035,100

Notes: 1. Inflation costs are based on 3% growth rate over 4 years (12.55%), except where noted.
2. Inflation costs are based on 3% growth rate over 5 years (15.93%).
3. 15% used to calculate unlisted items.
4. SCADA
5. SCADA and considerations for canal realignment, relocation, armoring and two-bank construction.

Table 8.2.3 Overall Estimated Project Costs

Item	850 cfs	1000 cfs
Construction Costs	$49,469,600	$52,667,300
Unlisted Items (10/15%)	$5,973,300	$6,354,700
Contingencies	$15,468,200	$16,466,900
Non-Contract Cost (37%)	$28,617,100	$30,463,300
TD&H Recommended Items	$7,966,000	$8,188,600
Inflation Costs	$6,432,100	$6,845,000
Subtotal	*$113,926,300*	*$120,985,800*
5% Tribal Fees	$5,696,300	$6,049,300
TOTAL PROJECTED COSTS	**$119,622,600**	**$127,035,100**

Estimated engineering fees for studies to be initiated in 2005 and subsequent design phases were presented in Section 7.0 and are summarized below.

Table 8.2.4 Summary of Design and Study Costs

Study/Design Phase	Estimated Fee
Environmental Compliance Documents	$262,500 to $1,000,000
Economic Study	$52,500
Basin Hydrology Study	$19,800
Preferred Alternative	$44,650
St. Mary Siphon Landslide Study	$79,400
Hydropower Feasibility	$40,450
Topographical Surveys	$99,250
Engineering Studies Subtotal	*$598,550 to $1,336,050**
Preliminary Engineering Reports (Total)	$1,430,000
Final Design (Total)	$4,770,000
Construction Management (Total)	$8,183,000
Engineering Design Subtotal	*$14,383,000*
5% Tribal Fees	$719,150
Total Design Costs	*$15,102,150*
TOTAL ESTIMATED ENGINEERING FEES	**$15,700,700 to $16,438,200**

* Includes 5% Tribal Fees

It is anticipated that the BOR will realize administration costs associated with this project such as reviews for feasibility/design studies and final design documents and limited construction oversight.

Although our estimated engineering fees are less than half (approximately $15,000,000 less) of that of the BOR's, we recommend using the Total Projected Costs listed above for funding request limits, since it is not known whether or not the BOR will perform engineering for this project.

We understand that the DNRC is seeking a one-time request for State funding in the amount of $500,000. If successful, we recommend initiating the Environmental Compliance process. Also, the Preferred Alternative (PA) study should be completed in 2005 to stay on track for an early 2007 construction start. The PA study requires the Basin Hydrology and Economic Studies be completed. In addition, the St. Mary Siphon Landslide Study should be started as soon as possible to obtain useful design information and observe the effects of two consecutive springs (2005 and 2006).

It is important to maintain progress, since some studies require up to two years and construction could take 8 to 10 years. Inflation increases project costs ±$3 million each year, and it is too important to the State of Montana to stop or delay progress made by DNRC and St. Mary Rehabilitation Working Group.